Can We Find Organic Materials in Food Using X-rays?

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CAN WE FIND ORGANIC MATERIALS IN FOOD USING X-RAYS?

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PURPOSE

Would you like to find an insect in your food?

Or get injured while eating?

Food Quality Assurance is essential, both in regards to consumer satisfaction and also food safety.

The **goal** is to demonstrate the improvement introduced in foreign body detection by a new X-ray imaging technique when organic materials are potential foreign bodies.

NEW TECHNOLOGY

Soft matter cannot be identified with conventional X-ray, but it is found in higher contrast in other imaging modalities, such as phase-contrast and dark-field, based on refraction and scattering properties. All three modalities are available when using a grating-based interferometer (GBI).

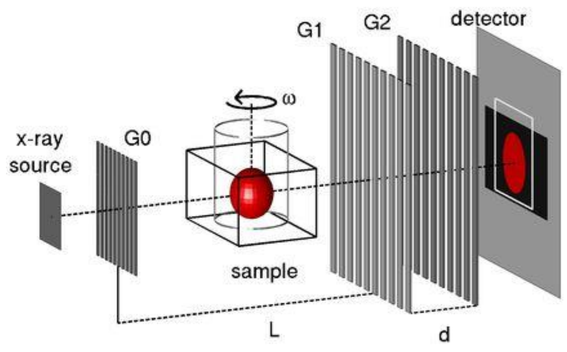
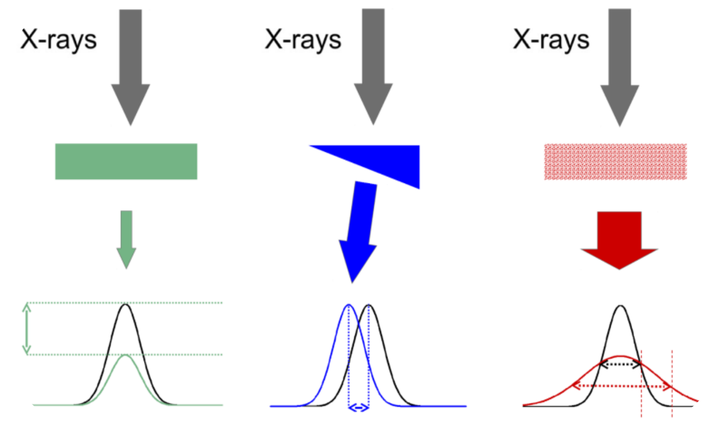
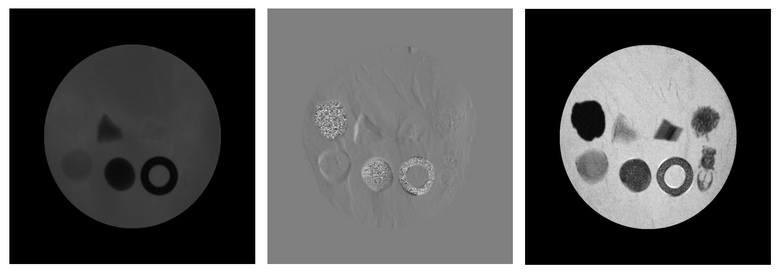


Figure 1. Sketch of a Talbot-Lau interferometer



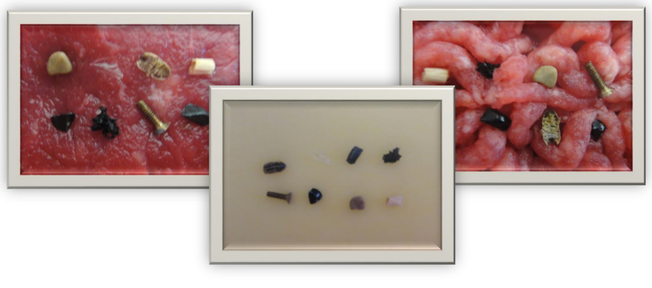


a) Absorption b) Phase contrast c) Dark-field

Figure 2. GBI modalities capturing attenuation, refraction and scattering.

MATERIALS AND METHODS

Food samples: Cheese, Steak and Minced Meat.



Selection of foreign bodies

- Different absorption, refraction and scattering properties
- Different sizes
- Suggestions NEXIM collaborators and Japanese survey

Hard plastic, soft plastic, rubber, stones, insects, metal, glass and wood.

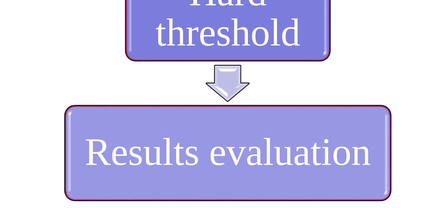
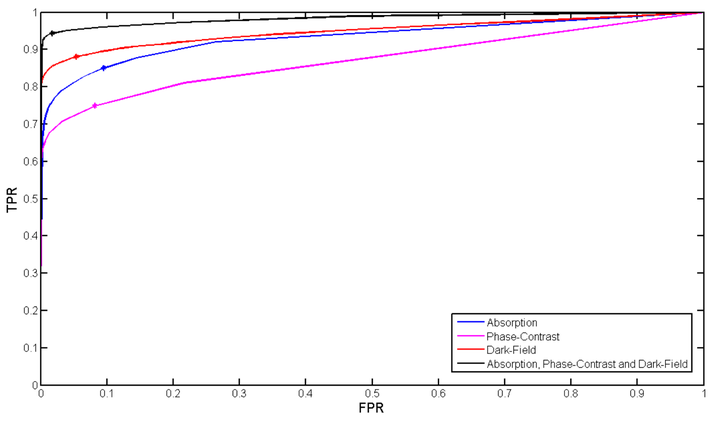


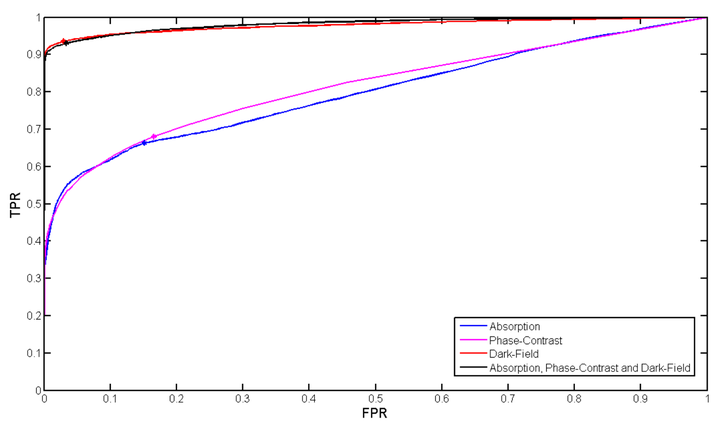
Figure 3. Steps in the design process of an automated foreign object detector.

RESULTS

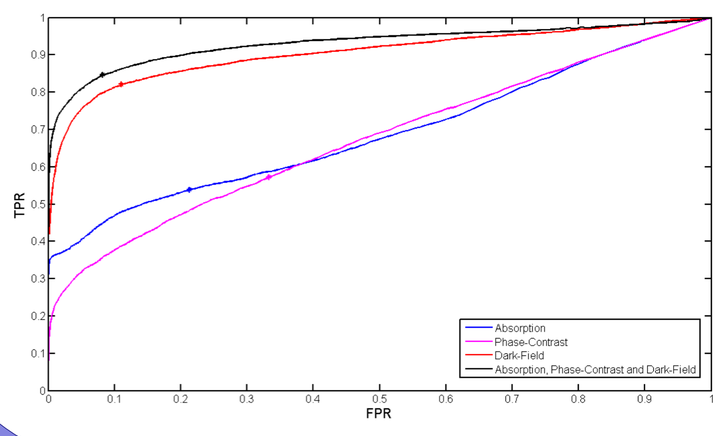
Cheese

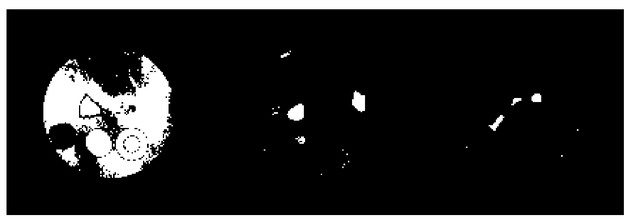


Steak

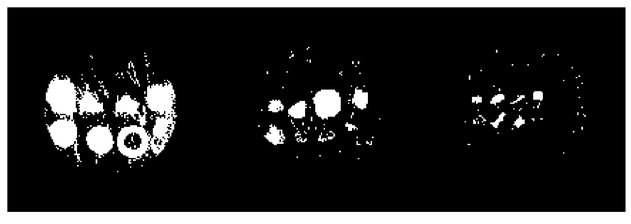


Minced Meat





ABSORPTION
VS
ABSORPTION, PHASE CONTRAST AND DARK FIELD



CONCLUSION

This new technology, GBI,

1. **Allows to detect organic matter.**
2. **Outperforms typical X-ray when there is a mix of organic and non-organic foreign bodies.**

More efficient than conventional X-ray for industries where organic materials are potential foreign bodies.